

# ***Software Technology Support Center (STSC)***

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*Helping Government Organizations Buy and Build Software  
Better*



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**What is this System  
Really Suppose to  
do?**

**Or the “You Must be  
Kidding Syndrome.”**



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# Speaker



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# ***System analysis steps***



- 1. Identify the customers need**
- 2. Evaluate the proposed system for feasibility**
- 3. Perform economic and technical analysis**
- 4. Allocate function to hardware, software, people and data (database)**
- 5. Establish cost and schedule constraints**
- 6. Create a system definition**



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# 1. *Identification of need*



- **Meet with customer and end-user**
- **Understand who the “real” customers are (and uncover political agendas)**
- **Understand the requirements**
  - Know the difference between customer requirements and desiresments
- **Establish goals**
  - Is current technology adequate to meet goals
  - What is potential market
  - How does system integrate with existing constraints
- **Document in a System Concept Document**



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## ***2. Feasibility Study***



- **Related to Risk Analysis and Risk management**
  - Development risks
  - Resources availability
  - Technology availability
  - Security
  
- **Evaluate feasibility of**
  - Economic feasibility
  - Technical feasibility
  - Legal feasibility
  - Examine other alternatives



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### ***3. Economic Analysis***



- **Perform Cost/Benefit analysis**
- **Lots of factors to look at**
  - cost reduction (CR)
  - error reduction (ER)
  - increased flexibility or capability (IF)
  - increased speed (IS)
  - improvement in management planning and control (MC)
  - security



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### ***3. Technical analysis***



- **Assessment of the technical viability of the system**
  - Is technology available?
  - What new materials, methods or processes are required?
- **Tool available**
  - Models and simulations
  - Probability theory
  - Queuing theory
  - Control theory



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# *How to do technical analysis*



## ■ **Build a System Model**

- Simple enough to understand, but as close to reality as possible (to yield valid results)
- Highlight factors that are relevant or important, and (with discretion) suppress those not as important
- Include relevant factors, and should give repeatable results
- Small enough to be timely. If too big, consider breaking down into many smaller models
- Make the model expandable and modifiable. This allows “tuning” of the model, and also expansion and inclusion of changing requirements





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## ***4. Allocate functions to...***



- **Hardware**
- **Software**
- **People**
- **Data (database)**
- **Other system elements**
- **Security**
  
- **Basically, an architectural model**



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## ***5. Establish cost and schedule***



- **Based on**
  - customer needs
  - economic feasibility
  - technical analysis
  - functional allocation
  - Security
- **Requires both management and customer buy-in**
- **Critical factor is typically time, not cost**



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## 6. Create systems definition



- The “blueprint” that guides the entire systems development.
- Explains what each area (hardware, software, etc) is responsible for.
- Explains interfaces between areas
- Forms the Systems Specification, which is the basis for future
  - hardware engineering
  - software engineering
  - database engineering
  - human engineering
  - Security engineering



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# *Modeling the system*

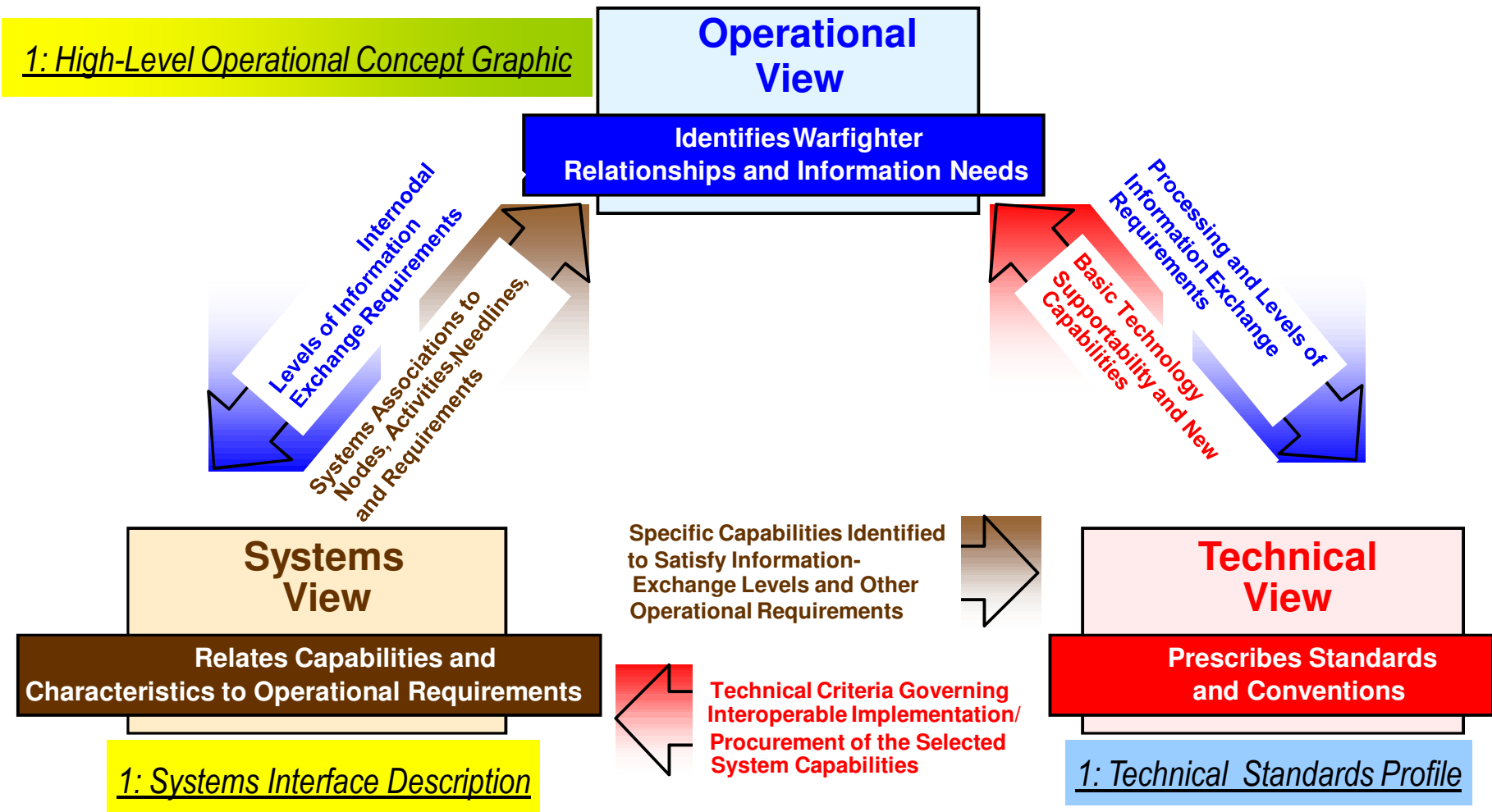


- It is necessary to define the boundaries of the system.
- Typically, a graphical representation or model is best for “first cut”
- Create different models or views of the system (operational view, system view, and technical view)
- DODAF is way to illustrate architecture
- An ACD (architecture context diagram) is another a high-level diagram that shows boundaries between the system and its’ environment. It lists external interfaces (informational boundaries)



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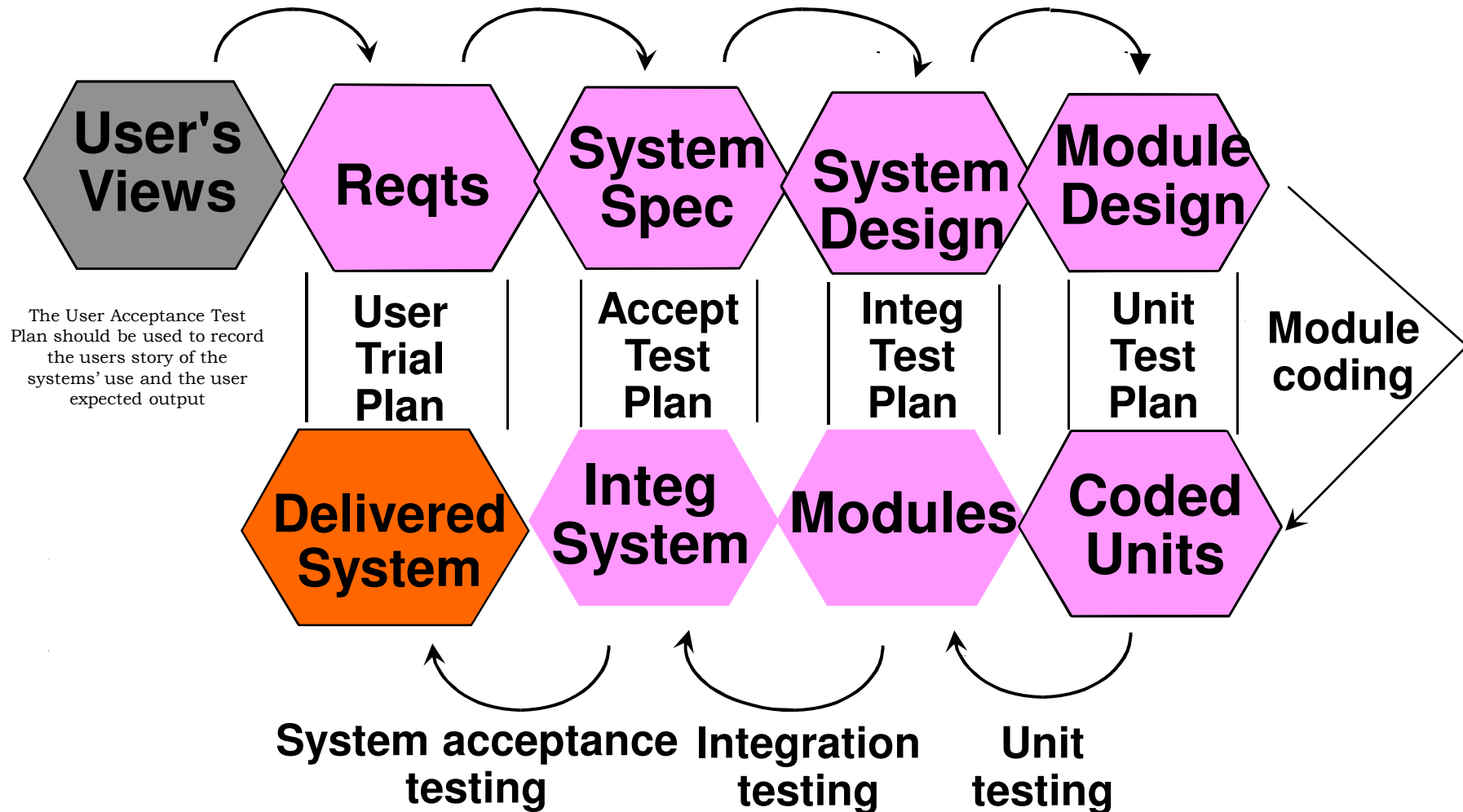
# Linkages Between the Views





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# Lifecycle approach





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# ***Software Engineering***



# ***Lifecycles***

## ***Strengths and Weaknesses***



<i><b>Capability</b></i>	<i><b>Pure Waterfall</b></i>	<i><b>Code-and - Fix</b></i>	<i><b>Spiral</b></i>	<i><b>Modified Waterfall</b></i>	<i><b>Prototype</b></i>
<b>Poorly understood requirements</b>	Poor	Poor	Excellent	Fair to Excellent	Excellent
<b>Poor Architecture</b>	Poor	Poor	Excellent	Fair to Excellent	Poor to Fair
<b>Highly Reliable System</b>	Excellent	Poor	Excellent	Excellent	Fair
<b>System Growth Built in Risk Management</b>	Excellent	Poor to Fair	Excellent	Excellent	Excellent
<b>Predefined Schedule</b>	Fair	Poor	Fair	Fair	Poor
<b>Midcourse Correction</b>	Poor	unknown	Fair	Fair	Excellent
<b>Customer Visibility</b>	Poor	Fair	Excellent	Fair	Excellent
<b>Management Visibility</b>	Fair	Poor	Excellent	Fair to Excellent	Fair
<b>Low Management and developer skill level</b>	Fair	Excellent	Poor	Poor to Fair	Poor
<b>Low Overhead</b>	Poor	Excellent	Fair	Excellent	Fair

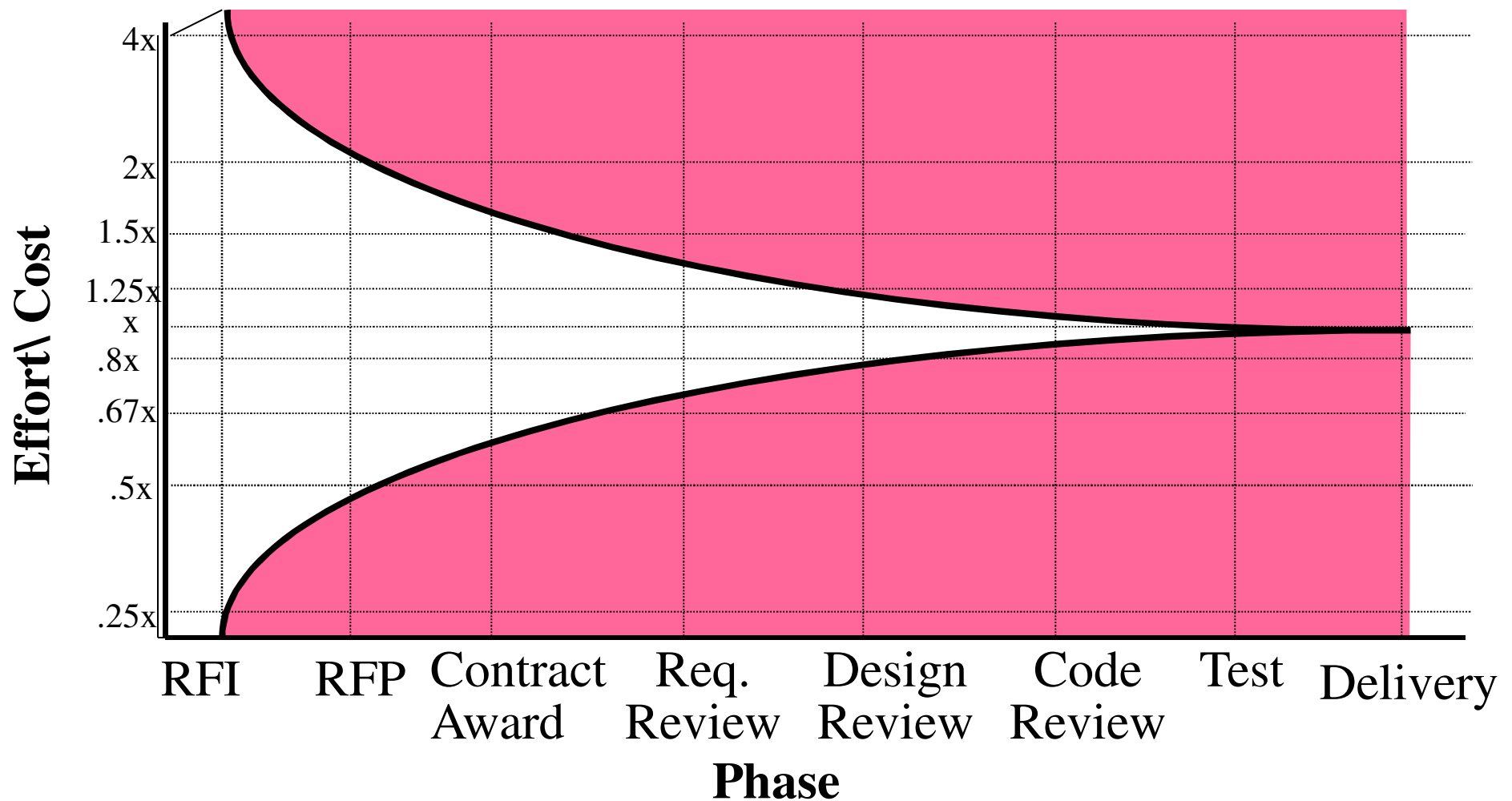
Rapid Development (McConnell, 96)





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# Change Possibility

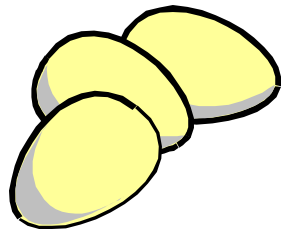


Cost Models for Future Life Cycle Processes: COCOMO 2.0 (Boehm, 1995)



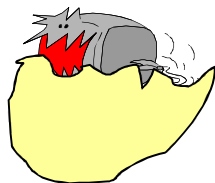
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# Finding Requirement Errors

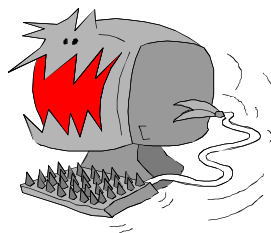


Requirements  
Review 1 hr

Design  
2.5 hrs

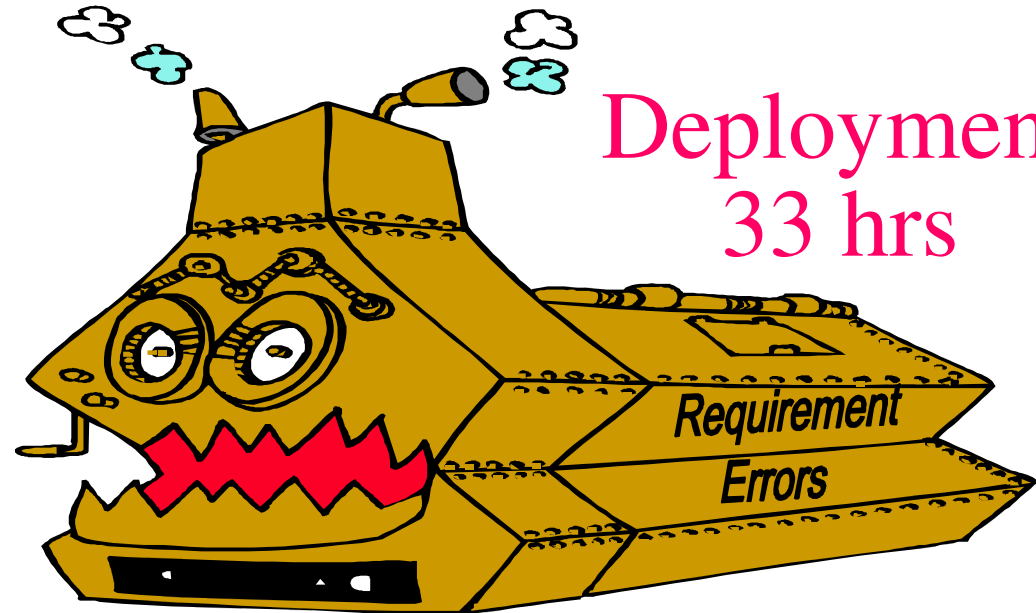
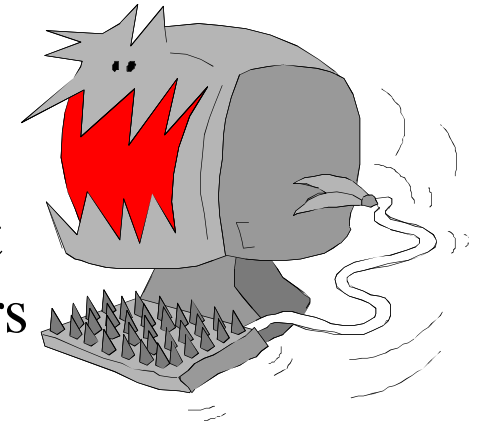


Code  
13 hrs



Deployment  
33 hrs

Test  
17 hrs





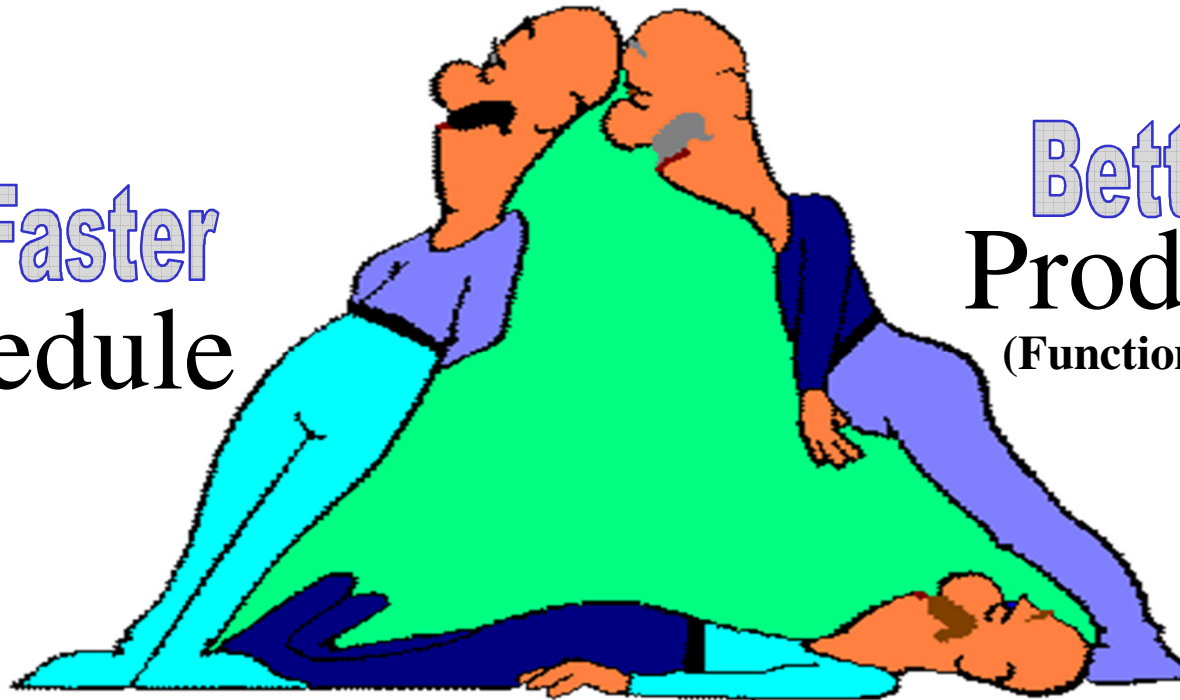
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# The Development Triangle



You can control change to only **two** sides of a triangle; The third side must freely adapt – or else it's not a triangle anymore.

Faster  
Schedule



Better  
Product  
(Functionality + Quality)

Cheaper Cost

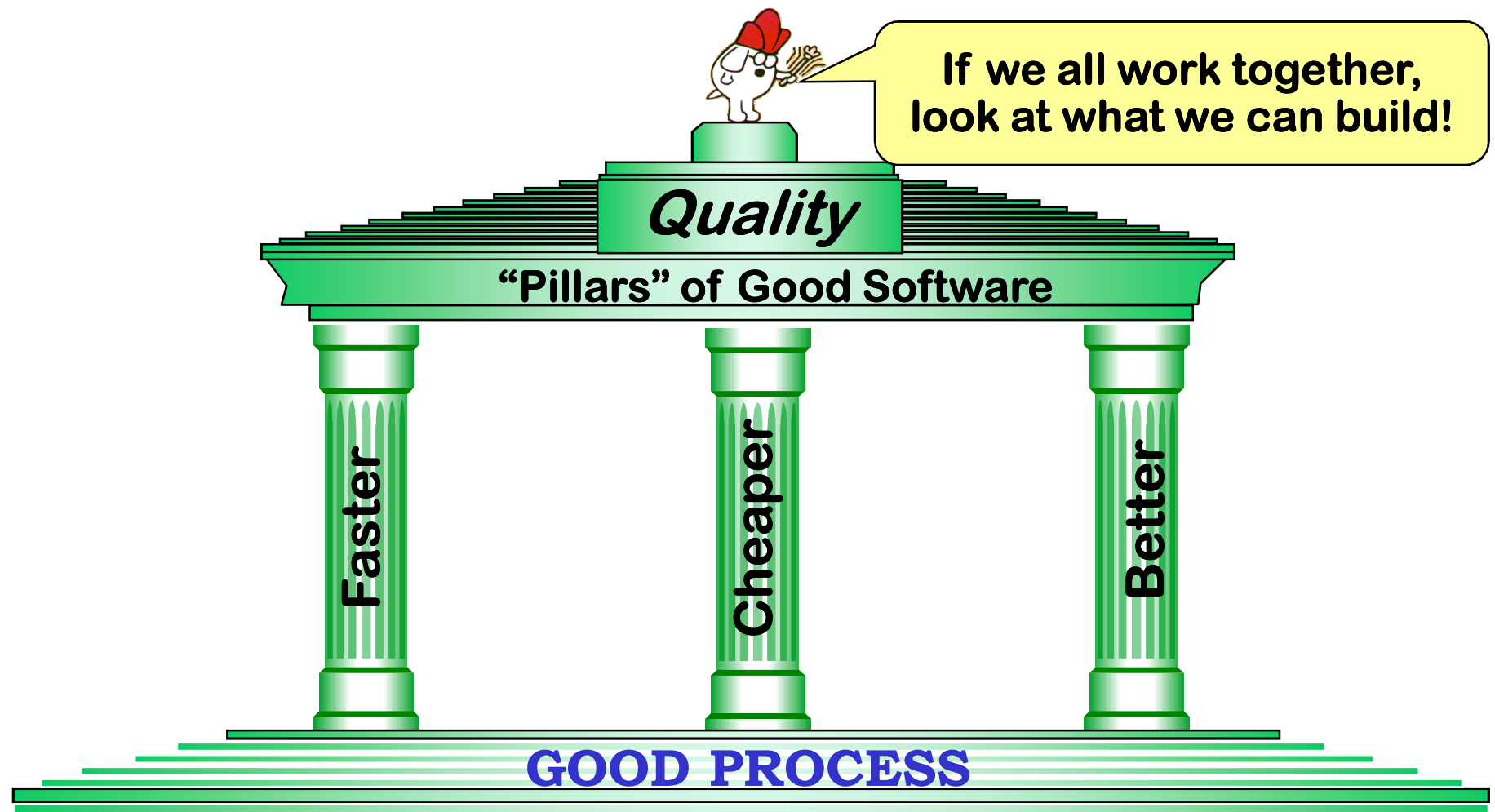
***Software is both a source of  
amusement and engineering  
achievement.***





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# *The Temple of Software Engineering*



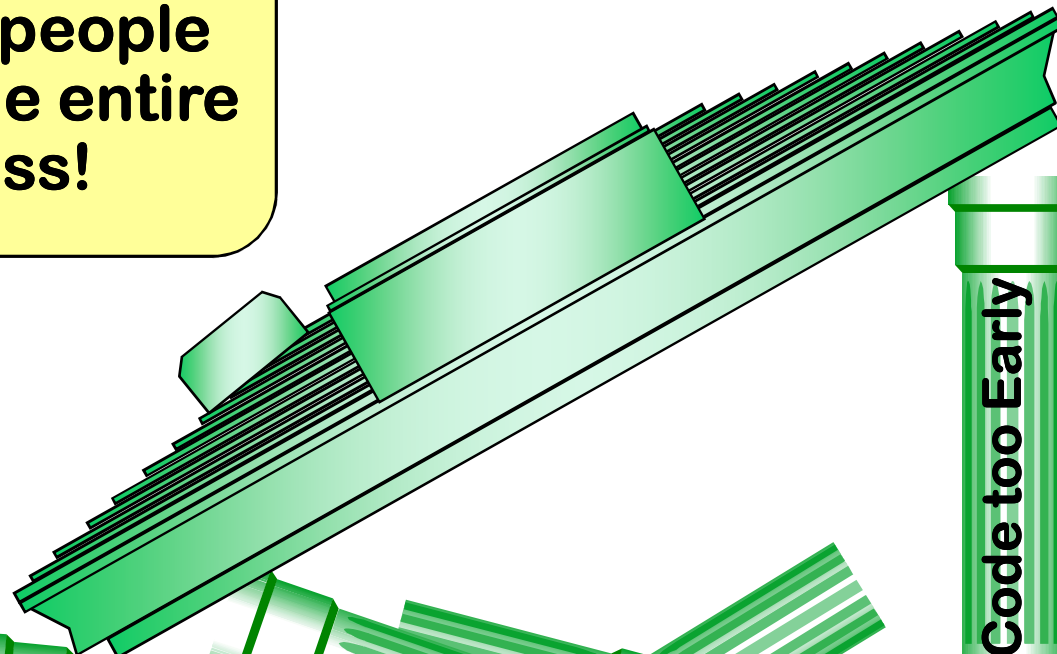
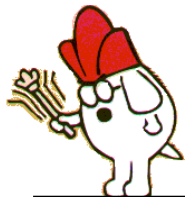


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# *The Temple of Software Engineering*



But just a few  
stubborn people  
can ruin the entire  
process!



**POOR PROCESS**

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## *More Information*



You can go on the internet and search for more information on the topics discussed and /or check on the links below:

*[www.dau.mil](http://www.dau.mil)*

*[www.nps.edu](http://www.nps.edu)*

*[www.afit.edu/about.cfm](http://www.afit.edu/about.cfm)*

[http://www.usability.gov/templates/docs/  
u-test\\_plan\\_template.doc](http://www.usability.gov/templates/docs/u-test_plan_template.doc)

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